

Intestinal Parasites in Southeast Asian Refugees Two Years After Immigration

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We collected stool specimens from 2,520 Southeast Asian refugees who had resided in the United States for an average of 2.1 years. More than half reported receiving prior treatment of parasites. At least one parasite was discovered in 32%, and multiple parasites were found in 8% of patients. Hookworm, Giardia, Strongyloides, and Hymenolepis nana were most commonly found. In comparison to studies done at the time of immigration, all parasites had decreased in frequency, but Giardia, hookworm, and H nana remain common. Although initial screening efforts may have failed to identify substantial numbers of infected refugees, poor compliance with treatment may also explain the persistence of intestinal parasites in our patients. The continued presence of Giardia and H nana, especially among children, may be explained by person-to-person transmission or autoinfection.

(Molina CD, Molina MM, Molina JM: Intestinal parasites in Southeast Asian refugees two years after immigration. *West J Med* 1988 Oct; 149:422-425)

About 800,000 Southeast Asian refugees have immigrated to the United States since 1975.¹ The first group of immigrants was, in general, well educated and from upper socioeconomic classes, while later immigrants were from more impoverished backgrounds.² Many of the immigrants before immigrating to this country were detained for a time in refugee camps that had poor sanitation and only rudimentary health screening.^{3,4} All present special challenges to health care practitioners because of language barriers, cultural differences in perceptions of disease, and health problems not often encountered by physicians in the United States.

Guidelines were published suggesting that health screening of all Southeast Asian refugees upon entry into this country include an examination of stool specimens for intestinal parasites.^{5,6} Several reports of the prevalence of intestinal parasites in these people on arrival in this country were also published.⁷⁻⁹ To our knowledge, no large-scale follow-up study of intestinal parasites in these refugees has been done.

At the Pacific Family Practice Medical Clinic (Long Beach, Calif), we have had the opportunity to care for approximately 5,000 Southeast Asian refugees. Most of these patients came from Cambodia, while a small percentage were members of the Hmong group from Laos. Most of the patients were agricultural workers before immigrating to this country. All were eligible for Medicaid at the time of the study. This study was done to obtain an estimate of the prevalence of intestinal parasites in a population of Southeast Asian refugees who had resided in this country for about two years and had presumably been screened for intestinal parasites on entering the United States.

Patients and Methods

Stool specimens were collected from 2,520 Southeast Asian refugee patients seen for the first time in the Pacific Family Practice Medical Clinic over a 12-month period. The specimens were collected in plastic containers with 15 ml of a solution of sodium acetate 1.5%, glacial acetic acid 2%, formaldehyde 1.6%, and water (Trend Scientific Inc, St Paul). The stool specimens were examined at the Pacific Hospital of Long Beach by licensed medical laboratory technicians using both the concentration¹⁰ and trichrome staining methods.¹¹ Although a previous study showed that the sensitivity of stool examination to detect intestinal parasites increases with the increasing number of stool specimens submitted from the same patient,¹² we chose to screen with only a single stool specimen to make our study more directly comparable to previously published reports of screening for intestinal parasites in this population that were based on examining a single specimen.

We interviewed a random sample of 299 of the patients who had positive stool specimens. A verbal history was elicited.*

Results

Stool specimens were obtained from 2,468 Cambodian and 52 Hmong refugees over a period of 12 consecutive months. We interviewed 299 patients with positive stool examinations to determine how long they had resided in the United States and whether they had been previously treated for intestinal parasites. This represents 11.9% of all patients

*Ngoun Chhin, Rany Khuon, and Ratha Or served as translators and assisted in the care of the patients.

submitting stool specimens and 37% of patients with positive stools. The mean length of residence was 2.13 ± 0.07 years (mean \pm standard error of the mean [SEM]). Of the patients interviewed, 54% gave a verbal history of previous therapy for intestinal parasites, but we were unable to determine for which parasites they were treated or which drugs were used in their therapy. The male to female ratio was 0.8 to 1.0. Most of our patients were young; 65% were younger than 20 years, and 88% were younger than 40.

The parasites most frequently found were hookworm, *Giardia lamblia*, *Hymenolepis nana*, and *Strongyloides stercoralis*. Nearly a third of the patients (32%) had at least one parasite, and infection with several parasites was found in 8% of patients (Table 1).

The frequency of certain parasites varied with the age of the patient. *G lamblia* and *H nana* were found more frequently in the 0- to 19-years age group, while hookworm was most frequent in patients 20 years of age or older (Table 2).

Of the 299 patients with positive stools that we interviewed, 117 had resided in this country for less than two years. Of this subgroup, 60% reported receiving previous therapy for intestinal parasites. In all, 48 patients had resided in this country for less than a year, and half of them reported previous treatment.

About half of the 182 patients who had resided in this country for two years or longer (51%) reported receiving previous treatment of intestinal parasites. There were 119 patients who had resided in this country for more than three years (40% of the total group interviewed). Table 3 shows the distribution of parasites in this group. When these data are compared with the overall data in Table 1, it can be seen that the four most commonly found parasites—hookworm, *G lamblia*, *H nana*, and *Strongyloides*—occurred with an even

greater frequency in those patients residing here more than three years as compared with all patients submitting stool specimens. Of the subgroup of 119 patients, 60 were younger than 19 years. In this group of children, we identified 26 cases of *Giardia*, 21 cases of hookworm, 9 of *Strongyloides*, 14 of *H nana*, 4 of *Clonorchis*, and 1 case of *Entamoeba histolytica*.

Of the 299 patients interviewed, 147 had hookworm. The length of residence in the United States for this subgroup ranged from 4 months to 6 years with a mean of 2.8 ± 0.7 years (mean \pm SEM). Of the patients with hookworm, 39% had resided in this country for more than two years. We found 12 women with hookworm who had been here for four years, four who had been here five years, and one who had resided in this country for six years. Of the patients with hookworm, 55% reported previous therapy for intestinal parasites.

All patients with positive stool specimens were treated appropriately following guidelines outlined elsewhere.¹³ In those patients in whom stool specimens were examined after treatment, 58% were free of parasites. We are not sure why treatment was not more successful, but noncompliance may play a large role. For example, in one family of six that had resided in this country for six months, we identified various parasites, at least one in each family member. The patients received appropriate treatment. Examining stool specimens after treatment showed that not a single parasite had been eliminated from any member of the family, leading us to conclude that they had not taken the medication. They all reported receiving previous treatment of intestinal parasites, making us further suspect that they were noncompliant.

Discussion

This study was done to determine the prevalence of intestinal parasites in our patient population. The patients we care for are mostly poor immigrants from rural Cambodia. Nearly all were detained in refugee camps in Thailand, often under crowded and unsanitary conditions.^{3,4} The earliest refugees often received good medical care, but as more and more Cambodians fled, the medical resources were overwhelmed. At first it was thought that intestinal parasites were not a major problem in Southeast Asian refugees, probably attributable to the urban origins of the first refugees and reflecting the medical attention they received before immigrating.⁵ The country of origin clearly affects the infection rate,^{9,14} but the rate may be related more to the conditions in the refugee camps from which the various groups immigrated rather than to those of their native countries.

The studies of Parish¹⁴ and Tittle and co-workers¹⁵ show

TABLE 1.—Parasite Infection Rates by Ethnic Group in 2,520 Southeast Asian Refugees

Parasite	Ethnic Group			
	Cambodian N=2,468		Hmong N=52	
	Number	Percent	Number	Percent
<i>Giardia lamblia</i>	274	11.1	6	11.5
Hookworm	367	14.9	1	2.0
<i>Hymenolepis nana</i>	128	5.2	3	5.8
<i>Strongyloides stercoralis</i>	108	4.4	1	2.0
<i>Trichuris trichiura</i>	50	2.0	1	2.0
<i>Ascaris lumbricoides</i>	26	1.1	1	2.0
<i>Clonorchis sinensis</i>	42	1.7	3	5.8
<i>Entamoeba histolytica</i>	12	0.5	1	2.0

TABLE 2.—Parasite Infection Rates by Age in 2,520 Southeast Asian Refugees, Pacific Family Practice Medical Clinic

Parasite	Age Group, yr							
	0 to 19, N=1,608		20 to 39, N=578		40 to 59, N=194		60+, N=88	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<i>Giardia lamblia</i>	247	15.4	26	4.5	7	3.6	0	0.0
Hookworm	128	8.0	172	29.8	49	25.3	19	21.6
<i>Hymenolepis nana</i>	102	6.3	23	4.0	6	3.1	0	0.0
<i>Strongyloides stercoralis</i>	55	3.4	38	6.6	12	6.2	3	3.4
<i>Clonorchis sinensis</i>	16	1.0	22	3.8	5	2.6	2	2.3
<i>Trichuris trichiura</i>	27	1.7	14	2.4	7	3.6	3	3.4
<i>Ascaris lumbricoides</i>	16	1.0	8	1.4	1	0.5	2	2.3
<i>Entamoeba histolytica</i>	6	0.4	4	0.7	3	1.5	0	0.0

TABLE 3.—Prevalence of Intestinal Parasites in Refugees Residing in the United States for 3 Years or Longer

Parasite	N=119	
	Number	Percent
Hookworm	58	49
<i>Giardia lamblia</i>	39	33
<i>Strongyloides stercoralis</i>	22	18
<i>Hymenolepis nana</i>	20	17
<i>Clonorchis sinensis</i>	10	8
<i>Trichuris trichiura</i>	6	5
<i>Entamoeba histolytica</i>	3	3
<i>Ascaris lumbricoides</i>	3	3

TABLE 4.—Prevalence of Intestinal Parasites in Cambodian Refugee Children

Parasite	This Study, N=1,608, %	Parish, ¹⁴ N=102, %	Tittle et al. ¹⁵ N=27, %
<i>Giardia lamblia</i>	15.2	23.5	22.2
Hookworm	8.0	27.4	59.3
<i>Hymenolepis nana</i>	6.3	10.8	11.0
<i>Strongyloides stercoralis</i>	3.4	14.7	37.0
<i>Trichuris trichiura</i>	1.6	2.0	7.4
<i>Ascaris lumbricoides</i>	1.0	2.0	11.1
<i>Clonorchis sinensis</i>	1.0	2.0	3.7
<i>Entamoeba histolytica</i>	0.4	2.0	7.4

that intestinal parasites were prevalent among Cambodian refugees upon arrival in this country. In Table 4 we compare our findings in patients residing for more than two years in this country with their results obtained from patients on arriving in this country. Their findings were striking enough to prompt the suggestion that even asymptomatic Southeast Asian refugee children be screened routinely.¹⁴ This echoed the sentiment of Goldenring, who suggested screening all immigrant children who had resided in this country for less than three years.¹⁶ In fact, several studies have shown significant numbers of Latin American refugees infected even beyond three years.^{17,18} Although it can be argued that signs and symptoms should guide the use of laboratory studies, it has been shown that there is no correlation between symptoms and the finding of pathogenic intestinal parasites in Southeast Asian refugees.¹⁹ Our data support Goldenring's assertion that parasites will continue to be found in immigrant children for as long as three years. They also show that intestinal parasites remain a problem in Southeast Asian refugees who have resided in this country for three years or more (Table 3), as suggested by Levin and Sarfaty.²⁰

Most clinicians are familiar with the two most common pathogenic parasites encountered in our patients, hookworm and *G lamblia*, but many may be unfamiliar with the third most common parasite, *H nana*. More commonly known as the dwarf tapeworm, *H nana* is found throughout the world wherever crowded, unsanitary conditions exist. The parasites live for only a few weeks, primarily in the small intestine, but often they give rise to persistent infection due to autoinfection or reinfection by fecal-oral transmission. Manifestations range from no symptoms to anorexia, abdominal cramps, diarrhea, and even seizures.²¹ Because of its potential as a pathogen and because simple, effective treatment is available, we have chosen to include it among our list of pathogenic intestinal parasites.

Although previous screening probably accounts for the reduction in frequency of all parasites (Table 4), the prevalence of *Giardia*, hookworm, *H nana*, and *Strongyloides* in our patients is unacceptably high. Furthermore, 65% of our patients are children or adolescents. The most commonly encountered parasites in our patient population have the potential to cause anemia and malabsorption, which may impair normal growth and development. Therefore, we think screening of asymptomatic Cambodian refugees is warranted. In addition to the obvious deleterious effects of infection with parasites in childhood, infection during pregnancy is another problem for our young families. Eradicating parasites before pregnancy might decrease the number of prenatal visits and the exposure of mother and fetus to harmful medications. Furthermore, certain parasites may be passed from the mother to the neonate.²²

The reason for the continued high prevalence of intestinal parasites cannot easily be explained. Undoubtedly some patients escaped screening, others may have had falsely negative stool examinations at the time of immigration, and others (even though they reported previous treatment) may have been noncompliant with therapy. Many adult patients refuse to believe that they have intestinal parasites if they cannot "see the worms" in their stool. The finding that only 58% of patients were free of parasites after treatment and the anecdote previously mentioned in which an entire family showed no effect of treatment leads us to think compliance is often poor. Noncompliance with therapy may partly explain the persistence of intestinal parasites in these persons.

It has been our experience that considerable confusion exists about the life span of hookworm in humans. In experimentally produced hookworm infection in humans, Kendrick found hookworm eggs in the stool as long as six years after the initial infection,²³ and Palmer was still excreting eggs 15 years after infecting himself with hookworm.²⁴ Komiya and Yasuraoka in their authoritative review report the life span of hookworm in humans as being four to five years.²⁵ Hookworm is not indigenous to southern California, so our patients with hookworm must have acquired their infections in Southeast Asia. The finding of hookworm in patients residing in southern California for three to six years supports the notion that hookworm infection can persist in humans for years without reinfection.

Infection with intestinal parasites is a problem not confined to Southeast Asian refugees. Intestinal parasites are frequently found in immigrants from Latin America^{17,18} and in migrant farm workers in this country.²⁶ As a growing proportion of the population of the United States comprises immigrants from Southeast Asia and Latin America, infection with intestinal parasites is likely to be an increasingly important health problem in this country.

Infection with intestinal parasites continues to be a problem among Southeast Asian refugees even after they have resided in this country for several years. A continued immigration of Cambodian and Hmong refugees from camps in Thailand can be expected for years to come. Western physicians must familiarize themselves with the special health problems that these new patients will present.

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Book Review

The Western Journal of Medicine does not review all books sent by publishers, although information about new books received is printed elsewhere in the journal as space permits. Prices quoted are those given by the publishers.

Principles of Extracorporeal Shock Wave Lithotripsy

Edited by Robert A. Riehle, Jr, MD, Assistant Professor of Surgery (Urology), Cornell University Medical College; Assistant Attending Surgeon, and Director, Lithotripsy Unit, The New York Hospital-Cornell Medical Center, New York, and Robert C. Newman, MD, Assistant Professor of Surgery, and Chief, Clinical Stone Service, Division of Urology, University of Florida College of Medicine, Gainesville, Florida. Churchill Livingstone Inc, 1560 Broadway, New York, NY 10036, 1987. 248 pages, \$48.

This text represents a very good summation of the state of the art surrounding this new technique for the management of urinary tract calculi.

When one considers that the first application of this technique on humans was accomplished in the spring of 1980 by Christian Chaussy in Munich, followed by an extensive study of patients between that year and 1983, and that the first lithotripter was established in the US in March 1984, it seems remarkable that as of February 1986, 133 machines had been established worldwide, with 62 of those machines in the US having gone through Federal Drug Administration approval in the year 1984 following a six-site study in this country. This text represents an exceedingly fine progress report surrounding the four-year world experience since the major reports on clinical studies appeared in 1983.

The text spends considerable legitimate time reviewing the physics and geometry of extracorporeal shock wave lithotripsy, the biologic effects of shock waves, design considerations of a unit, all before patient selection and treatment are discussed. These sections are very worthwhile and give a good background of information to the practicing physician.

The sections of the book on patient selection and management do represent an up-to-date compilation of clinical data from several sources, which clarifies very nicely for the clinical urologist the learning curve that has progressed so quickly over the last few years with this technique.

I would recommend this text for its baseline information for the clinical urologist engaged in the care of people with renal stone disease.

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